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THE GENUS CERATINOPTERA (ORTHOPTERA, BLATTIDAE, PSEUDOMOPINAE)

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Recently, in studying certain species of North American Blattidae, it has been found necessary to determine what species should properly be referred to the genus *Ceratinoptera*. Fortunately, the genotype *C. picta* and also *nahua*, genotype of *Paraceratinoptera*, are represented in the collections before us, and, with these important species at hand, we are able, for the first time in its history, to restrict the genus to reasonable bounds.

CERATINOPTERA Brunner

1865. *Ceratinoptera*, Brunner, Nouv. Syst. Blatt., p. 75.

GENOTYPE.—*Ceratinoptera picta* Brunner, selected by Kirby, 1904.

This genus, from the very time of the original description, has been the repository of any species of the Pseudomopinae which showed somewhat abbreviate but not truncate tegmina (at least in the male sex), and which did not exhibit some striking feature considered sufficient to warrant further generic distinction (such as found in *Anisopygia jocosiluna* and other species). The generic history given below compels the restriction of this entity to the complex described by Saussure as *Paraceratinoptera*; to this belong the genotype, *Ceratinoptera picta* Brunner, *Ceratinoptera nahua* (Saussure), a new species here described and probably *Ceratinoptera castanea* Brunner. No material of *castanea* being available, we have not discussed that species in the present paper. Of the many other species which have been referred to this genus, the vast majority represent forms having reduced tegmina, belonging to other genera the recognized species of which do not show this feature, or to genera yet undescribed. The use of moderate tegminal reduction as a feature of the first importance has brought about this unfortunate situation.

Greater tegminal reduction, showing these organs truncate in both sexes, has been built up into the present heterogeneous

genus *Temnopteryx*,¹ while into *Loboptera* have been forced a host of forms showing still greater tegminal reduction, these organs in such forms being represented by mere lateral pads. We have cited these genera as they at present represent in the literature the same sort of misconception and resultant unnatural association of species as is found in *Ceratinoptera* as generally understood.

History

In 1865, Brunner described the genus *Ceratinoptera*,² including three new species, *picta*, *castanea* and *peruviana*; *Blatta diaphana* Fabricius (unknown to Brunner), and *Blatta poeyi* and *porcellana* of Saussure. In 1868, Saussure described *Paraceratinoptera*,³ including the single species *nahua*. Saussure and Zehntner later described *Paraceratinoptera dohrniana*.⁴ Kirby, in 1904, selected *picta* as the type of *Ceratinoptera*.⁵ In 1906, Bruner described *Phyllodromia* (?) *binotata*.⁶

The names *picta*, *nahua*, *dohrniana*, *binotata*, and probably *castanea*, are referable to *Ceratinoptera* in its restricted sense. We are able furthermore to add that, from material undoubtedly correctly determined as to the species, *diaphana*, *poeyi*, *porcellana*, *pygmaea*, *lutea*, *puerilis*, probably *peruviana* and a number of the African species referred to *Ceratinoptera*, belong to other and very distinct genera.

Synonymy

Saussure's *Paraceratinoptera* was separated from *Ceratinoptera* by a single character, the absence of arolia between the tarsal claws. We find that Brunner's *picta*, later properly selected as genotype of *Ceratinoptera* by Kirby, not only agrees in this feature but in all other features of generic diagnostic importance found in

¹ This has caused the females of a number of species of *Ischnoptera* having truncate tegmina to be described as species of *Temnopteryx* and those having lateral greatly reduced tegmina as *Loboptera*. See Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1910, p. 407, (1910).

² Nouv. Syst. Blatt., p. 75.

³ Rev. et Mag. Zool., 2e ser., xx, p. 357.

⁴ Biol. Cent.-Amer., Orth., i, p. 49, (1893).

⁵ Synon. Cat. Orth., i, p. 98.

⁶ Journ. N. Y. Ent. Soc., xiv, p. 140.

Saussure's genus.⁷ As a result *Paraceratinoptera* is an absolute synonym of *Ceratinoptera*.

Generic Position

The present genus is a member of the group Blattellites, in linear position best placed at the beginning of the genera having the tegminal discoidal sectors oblique. It is widely separated from the other genera of the group, not only by the very heavy femora, but also by the absence of arolia between the tarsal claws. The armament of the ventro-cephalic margin of the cephalic femora agrees best, among the described genera, with *Marcta*. The nearest general resemblance in femoral form and armament of piliform (but not the distal) spines is, however, found in the widely separated genus *Plectoptera*.

The features of greatest generic importance are found in the short heavy maxillary palpi; the very narrow and scarcely opaque deflexed lateral margins of the pronotum; the corneous tegmina, which, when elongate and overlapping, have the dextral concealed area as colorless as the wings, and the short heavy and weakly spined limbs, with armament of ventro-cephalic margin of cephalic femora unusual in the group, and arolia absent between the tarsal claws.

Generic Description

Size small, form compact and rather stout for the Blattellites. Head evenly convex without flattening between or below the eyes; ocellar spots weakly indicated or distinct meso-dorsad of antennal sockets, or entirely absent; maxillary palpi short and stout, with distal joint much enlarged and decidedly longer than penultimate joint; lateral margins of face weakly convexo-convergent to bases of jaws. Pronotum ample; evenly convex, this decided only at the very narrow deflexed lateral margins which are rather broadly rounded; caudal margin truncate, transverse or very faintly convex. Tegmina fully developed, decidedly reduced or greatly reduced and truncate distad; moderately corneous to corneous, with veins not pronounced to very weakly indicated. In the fully developed tegminal condition, the area of the dextral tegmen concealed when at rest, is conspicuous in being colorless and as transparent as the wing. In conditions where the discoidal sectors of the tegmen are not eliminated by

⁷ Material before us, referable with certainty to the genotypes of both *Ceratinoptera* and *Paraceratinoptera*, clearly demonstrates these facts. Many important features were omitted in the description of *picta*; though the original description of *nahua* is incomplete, the genus and species was later much more fully discussed and figured by Saussure, Miss. Sci. Mex., Rech. Zool., vi, p. 87, pl. I, fig. 30a, pl. II, figs. 47, 47a, (1870).

reduction, these are seen to be distinctly oblique; all of the veins of the tegmen and wing are, in their fully developed condition, numerous but somewhat irregular. Wings fully developed, decidedly reduced or minute and vestigial. Wing, in its fully developed condition, exceedingly delicate, with marginal area very elongate and scapular field brief with few weakly clavate costal veins; a decided transverse vein connects the discoidal and ulnar veins proximad, the median vein does not extend proximad to this point (all of these veins are not strongly defined, which probably explains the omission of the median vein in Brunner's figure of *picta* and the omission of this transverse vein in Saussure's figure of *nahua*), the ulnar vein branching only extremely distad or not at all; intercalated triangle present but very small; axillary vein with a number of branches. Abdomen of males with seventh dorsal segment distinctly specialized mesad. Supra-anal plate (tenth dorsal abdominal segment) in both sexes wider than long, rather strongly triangularly produced, with lateral margins weakly convex and apex rounded. Subgenital plate of males somewhat asymmetrical, bearing stout styles; of females ample, rather strongly emarginate and with a brief longitudinal cleft mesad on the distal margin. Limbs short and stout for the group. Cephalic femora with ventrocephalic margin unarmed in proximal third, supplied in distal two-thirds with a close-set row of minute piliform spines terminated by two long stout distal spines, no genicular spine present, ventro-caudal margin with a single distal spine and occasionally one or two very small marginal spines. Other femora with ventral margins weakly supplied with small spines, armed distad with a long genicular spine and at the extremity of each ventral margin with a single shorter spine. No arolia are present between the tarsal claws.

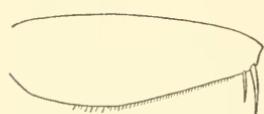


Fig. 1. *Ceratinoptera nahua* (Saussure).

♀. Minatitlan, Mexico. Outline of cephalic face of cephalic femur. (Greatly enlarged.) (Typical for genus *Ceratinoptera*.)

Material Examined

The genus is apparently rare in collections; twenty-three specimens before us are, with four exceptions, all from the Philadelphia collections.

Generic Distribution

The genus is known from the eastern mountains and coastal section of Mexico, as far north as the vicinity of Vera Cruz, and is probably widely distributed southward through Central America and northern South America, the limital records being Caparo, Trinidad; Brazil; Contamano, Peru,⁸ and Cauca, Colombia.

⁸ From Brunner's description it does not appear probable that *C. peruviana*, described from Peru, is a member of this genus as properly restricted. All our exotic material suggests, furthermore, that the genus is restricted in distribution to the Americas.

Ceratinoptera picta Brunner (Fig 2.)1865. *Ceratinoptera picta* Brunner, Nouv. Syst. Blatt., p. 76, pl. I, figs. 4,A to E. [σ , ♀, Brazil.]1906. *Phyllodromia (?) binotata* Bruner, Journ. N. Y. Ent. Soc., xiv, p. 140.

[♀? (mistake, specimen a male), Trinidad.]

The type of Brunner's *binotata*, which that author has most kindly sent us for examination, shows beyond question the above synonymy. The specimen exhibits a slight and unimportant color variation, the striking meso-caudal pronotal marking being narrowly and very weakly suffused mesad; the tegmina are fully developed.

Brunner's description of the insect leaves no room for doubt as to the identity of the material before us, but he fails to mention any of the important features found in the limbs (see generic description), furthermore his figures are not minutely accurate, portions of the wing venation and of the distal abdominal segments being clearly sketchy.

The species is appreciably smaller and more slender than *C. nahua*. The ocellar spots are pale and distinct. The distal (fifth) joint of the maxillary palpi is very large and strongly obliquely truncate, nearly half again as long as the fourth joint, subequal in length to the third. Pronotum very weakly transverse. Tegmina and wings fully developed in all material known, as in *nahua* when this condition there occurs (see generic description); but the area of the dextral tegmen, concealed when at rest, is in the present insect suddenly and very sharply defined, while the area embracing the swollen portions of the costal veins of the wings is somewhat embrowned. The broad proximo-mesal depression of the seventh abdominal segment in the male is weakly raised mesad, the margins of this elevation forming a triangle with apex cephalad and supplied with a cluster of hairs; the eighth and ninth dorsal abdominal segments are narrower with caudal margins alone visible. The male supra-anal plate is triangularly produced with margins weakly convex and apex rounded; in the female it is similar but with apex distinctly angulato-emarginate. The male subgenital plate is moderately large,



Fig. 2. *Ceratinoptera picta* Brunner.

♀. Caparo,
Trinidad. Dor-
sal view of pro-
notum (X 4.)

strongly convex, with two stout briefly separated styles deeply inserted mesad on the distal margin, the dextral twice as long and more deeply inserted than the sinistral, both with very minute teeth on their dorsal surfaces. The female subgenital plate is large, with distal margin broadly convex, with a decided median emargination the sides of which are broadly convex, thus forming toward its apex a brief longitudinal cleft. Limbs similar to *nahua* (see generic description).

Measurements (in millimeters)

	Number of specimens	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	W.
♂						
Contamano, Peru.....	(1)	8.3	2.6	2.9	8.1	2.5
Trinidad.....	(1)	8.7	2.7	3.1	8.3	2.8
♀						
Caparo, Trinidad.....	(1)	8.9	2.6	3	8.4	2.7

It is evident from Brunner's description that the types of the species are slightly larger than the specimens before us, while the males have the tegmina distinctly reduced ("length 6 mm."). So much size and tegminal variation occurs in *nahua* that we attribute the difference here found to similar individual variation.

General color of head and pronotum very deep shining blackish brown, the pronotum with a large meso-caudal marking of light buff (see fig. 2); in the male the lateral margins of the pronotum are very narrowly and very slightly paler than the general color. Tegmina clear shining blackish brown, darkest proximad; excepting third of dextral tegmen concealed when at rest which, like the wings, is hyaline, transparent, the veins giving a whitish cast. Maxillary palpi and limbs buffy, ventral surface of thorax dark brown. Abdomen above and below ochraceous buff, very broadly suffused laterad and distad with blackish brown.

Specimens Examined: 5; 4 males and 1 female.

Olas de Moka, Solola, Guatemala, 3000 feet, IX, 1908, (G. P. Englehardt), 1 ♂, [U. S. N. M.].

Cacao, Trece Aguas, Alta Vera Paz, Guatemala, III, 1907, 1 ♂, [U. S. N. M.].

Trinidad, (H. D. Chipman), 1 ♂, type of *P. (?) binotata* Bruner, [Bruner Cln.].

Caparo, Trinidad, VI, 1913, (S. M. Klages), 1 ♀, [A. N. S. P.].

Contamano, Rio Ueayali, Peru, X to XII, 1912, 1 ♂, [A. N. S. P.].

Ceratinoptera nahua (Saussure) (Figs. 1 and 3.)

1868. *Paraceratinoptera nahua* Saussure, Rev. et Mag. Zool., 2e ser., xx, p. 357. [♂, ♀, Cordillera Oriental, Mexico.]
 1893. *Paraceratinoptera dohrniana* Saussure and Zehntner, Biol. Cent.-Amer., Orth., i, p. 49. [♂, Guatemala.]

That *dohrniana* is a synonym of *nahua* is evident from the description and study of the series now before us, the name being based solely on a specimen showing the fully developed condition of tegmina and wings. Specimens from the same Guatemalan series with reduced tegmina were at the same time recorded as *nahua*. In the present Mexican material two of three series show both of the above conditions and decided size variation as well. Brunner's *castanea*, from Brazil, appears, from the original description, to be a closely related but distinct species.

The species is rather small and stout. The ocellar spots are distinct in specimens having fully developed tegmina, distinct to obsolete in individuals having reduced tegmina.⁹ The maxillary palpi are as in *C. picta*. The pronotum is distinctly transverse. The tegmina and wings when fully developed are much as in *picta*, but the area of the dextral tegmen, concealed when at rest, is less suddenly and more gradually defined, while the area embracing the swollen portions of the costal veins of the wings is very weakly suffused. The specialization of the seventh dorsal abdominal segment in the male is as in that sex of *picta* and the eighth and ninth dorsal abdominal segments are also similar. The genitalia are very similar in both species, the supra-anal plate in the female of the present insect has the apex very slightly angulato-emarginate. The two species differ distinctly in size and form and conspicuously in coloration.



Fig. 3. *Ceratinoptera nahua* (Saussure).

♀ Minatitlan, Mexico. Dorsal view of pronotum. (X 4 $\frac{1}{2}$.)

⁹ Reduction in the ocelli or the ocellar spots almost always occurs in the Blattidae with reduction in the organs of flight. Ignorance of this fact has in the past often given rise to decided difficulties and in some cases serious mistakes.

Measurements (in millimeters)

	Number of specimens	Length of body ¹⁰	Length of pronotum	Width of pronotum ¹¹	Length of tegmen	Width of tegmen
♂						
Orizaba, Mexico	(1)	10	2.7	3.3	8.5	2.9
Motzorongo, Mexico .	(2)	9.6-9.8	2.9-3	3.4-3.8	9.3-10	3.2-3.3
Motzorongo, Mexico .	(2)	9.9-10	2.9-3.1	3.9-4.1	6.3-6.4	2.7-2.8
Minatitlan, Mexico . .	(1)	9.8	2.6	3.8	6.7	2.6
♀						
Orizaba, Mexico	(1)	10.5	3	3.8	6.2	2.5
Motzorongo, Mexico .	(2)	10.7-10.8	3.3-3.4	4.1-4.6	6.1-6.2	2.9-3
Minatitlan, Mexico . .	(2)	9	2.8-2.9	3.9-4.1	5.1-5.3	2.7-2.8
Quirigua, Guatemala	(1)	10	3	4	5.4	2.7

It is evident from this series that the variation in size and in tegmina and wings is due to individual variation and not to geographic distribution.

General color shining dark chestnut brown to dark russet. Pronotum unicolorous or varying individually as follows; lateral margins sometimes very narrowly to narrowly paler, disk sometimes with much suffused tawny markings, these two meso-caudal minute dots varying to a small meso-caudal blotch (see fig. 3), sometimes with the greater mesal portion of the disk in addition very slightly paler than the other portions of the same. Maxillary palpi and limbs ochraceous tawny, usually somewhat suffused. Abdomen of general color, shading mesad both above and below to tawny.

Immature examples have the head, pronotum, mesonotum and lateral margins of the dorsal abdominal segments, shining chestnut brown. The pronotum narrowly margined laterad, the entire metanotum and the mesal portion of the dorsum of the abdomen, buffy. Limbs and underparts, not including the head, buffy.

¹⁰ The even numbers given for this dimension are approximated, the specimens being in these cases much distorted.

¹¹ A widening in the pronotum caudad, accompanied by a lessening of the convexity of the caudal margin, appears often to accompany reduction in the organs of flight in the Blattidae. Such variation in the pronotum is noticeable, but not pronounced, in the present series.

The ootheca is carried with suture dorsad, this suture with minute double-knotted projections separated by about twice their own diameter. Surface of ootheca strongly convex, weakly roughened and covered with a scattering of minute hairs. The extruded distal surface is curved evenly upward to base of suture without a keel.

Specimens Examined: 17; 7 males, 6 females and 4 immature examples.¹²

Orizaba, Vera Cruz, Mexico, I, 1892, 1♂, 1♀, 1 juv. ♂, [Hebard Cln.]. (♂, tegmina elongate.)

Motzorongo, V. C., Mex., II, 1892, 4♂, 2♀, 2 juv. ♂, [Hebard Cln.]. (2♂, tegmina elongate.)

Minatitlan, V. C., Mex., II, 1, 1892, 2♂, 2♀, [Hebard Cln.].

Quirigua, Guatemala, II, 1912, (W. P. Cockerell), 1♀, [U. S. N. M.].

Pózo Azul de Pirrís, Costa Rica, V, 10 to 20, (M. A. Carriker Jr.), 1 juv. ♂, [Hebard Cln.].

Ceratinoptera tropaia¹³ new species (Fig. 4.)

This species is related to *C. nahua*, the greatest differences in males being found in the smaller size, decidedly less transverse pronotum, truncate tegmina, vestigial wings, less decidedly specialized mesal portion of seventh dorsal abdominal segment and solid and darker general coloration.

Type: ♂; Motzorongo, Vera Cruz, Mexico. February 1892. [Hebard Collection, Type No. 417.]

Description of Type.—Size very small, form moderately stout. Eyes very widely separated, not quite reaching as far as mesal portion of dorsal margin of antennal sockets, ocellar spots absent (see footnote 9). Head and maxillary palpi as given in generic description. Pronotum proportionately deeper than in *nahua*, margin evenly rounding to latero-caudal angles which are rather broadly rounded, rectangulate; caudal margin truncate, transverse. Tegmina corneous, very slightly longer than wide, sutural margins attinged distad, caudal margins truncate and moderately oblique toward the sutural margins, this truncation causing a decided inward bending of the anal vein, brief proximal portions of other veins almost indistinguishable. Sev-

¹² In addition we have before us an immature example of the genus from Cauca, Colombia. This specimen is dark shining blackish brown in general coloration with pronotum immaculate, but in other features of paler coloration agrees exactly with the immature examples here recorded.

¹³ From *τροπαία*=a change from. In allusion to the differences from the genotype in the organs of flight.

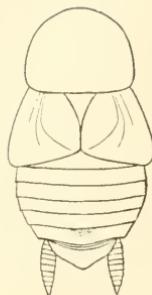


Fig. 4. *Ceratinoptera tropaea*
new species.

♂, type.
Motzorongo,
Mexico. Dorsal
outline. (X 5.)

Measurements (in millimeters)

	Length of body ¹⁴	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Motzorongo, Mexico, type.....	7.5	2.4	2.9	2.6	2

Coloration. General color dark shining chestnut brown; the very narrow lateral margins of the pronotum, alone of the entire dorsal surface, very slightly paler. Head shining chestnut brown, with antennae and maxillary palpi of the same color. Limbs suffused dresden brown. Median portion of ventral surface of abdomen cinnamon-brown, merging gradually into the general darker coloration laterad and distad.

The type is unique.

¹⁴ This measurement is approximated as the type has the abdomen somewhat crushed proximad.